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Think(er)ing with Epigenetics

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Epigenetics is a much-debated field of research in the contemporary biomedical sciences. Focusing on the processes of chemical regulation surrounding (hence: epi-) genetic material, epigenetic studies use a different entry point than DNA structure to understand difference and variance in species. In studying the relationship between genes, bodies, and the environment, the science of epigenetics is considered to be radically altering the dominant belief in genetic determinism and the risk of reductionism inherent to it. Interestingly, as such studies multiply and stir the imagination, the research area of epigenetics changes as well. As knowledge about epigenetic mechanisms expands, a growing body of literature in the social sciences has emerged exploring the social dimensions of this new field.

The field of epigenetics (re-)emerges in a politically and morally charged domain, marked by a history of eugenics, biopolitics, and related debates on nature/nurture. Epigenetics has been heralded by some as finally helping us to move beyond that history and its violent assumptions, while others have warned of a potential reiteration of the same problematic assumptions in the terms of individual biochemistry (thereby obscuring socio-political and historical environmental factors again). Agendas of ‘environmental justice’ and ‘intergenerational equity’ seem potentially as much strengthened as weakened by epigenetics, depending on the epistemological as well as ethical values performed by the respective research-designs. Indeed, the notion of ‘evidence’ cannot be taken for granted, and this is why we proposed, in a two-day workshop, to ‘think and tinker with’ epigenetics as a mode of attention towards body-environment interactions: How do these interactions challenge scientific, moral and political assumptions?


“Knitting the threads of life” by Matt Forsythe

The conference kicked off with a lecture from Vanessa Lux (Ruhr University Bochum) discussing the hype and challenges of molecular epigenetics. In order to understand the current fascination with epigenetics, she gave an important cultural history of the field, guiding us from Waddington’s ‘epigenesis’ to the twentieth “century of the gene” (Keller 2000) and into the twenty-first century and its epigenetic present. As she argued, the term ‘epigenetics’ has a history. How has it evolved? How does it relate to officially discarded theories and doctrines, like Lamarckism and the theories of Lysenko? And how does epigenetics, as we know it today, invite us to re-tell aspects of those histories? She problematized the metaphor of the ‘epigenetic code’ in recent postgenomic sciences which once again squeezes molecular biology findings into a framework of conceptual reductionism. She argued that current molecular epigenetic research always has to be aware of the risks that come with inheriting the unresolved problems of this buried ‘epigenetic’ heritage, contributing to its hype as well as the still existing

rejections against the field.

Taking inroads into contemporary scientific practices of environmental epigenetics, Ruth Müller (TU München) pointed in her lecture to the normative inflictions in this field, for example in how common-sense assumptions about sex and gender, but also race and class, are present in the design, interpretation and dissemination of experiments on the epigenetic effects of maternal care mostly conducted in rodents. While this normative interpretation is often attributed to (bad) science communication and media framing, Müller demonstrates how long-held societal and scientific 'pre-ideas' about good and bad mothers and mothering practices are inscribed into the experimental design of environmental epigenetics. Delving into key scientific work such as the influential Weaver experiment (2014), she demonstrated how the licking and grooming of pups by their moms comes to stand in for the value-laden category of 'maternal care'. These key experiments that are cited again and again as paradigmatic to the emerging field of epigenetics reflect important narratives about mother offspring relationships.

During the discussion, the political dimensions implied in these epigenetic scientific practices were emphasized. As the work of Müller so painstakingly illustrates, current research trends in epigenetics all too often work to reify rather than interrogate existing stereotypes about, for example, maternal agency and responsibility. While potentially opening up the space for bringing 'social environments' into the politics of health responsibility, there is a tendency to reduce these 'environments' to 'mother's behaviors/bodies'. Not least, such research thereby feeds into current reductionist tendencies of stressing *individual* maternal responsibility for health rather than counteracting them. In general, there are two major problems with operationalizing 'the environment' in this way (Kenney and Müller, 2016; Meloni, 2016). The first one is epistemic: while valuable in some cases, in others it is questionable in how far such reductionism can offer analyses that are capable of accounting for the actual complexity of the environments including important biological nuances and ambiguities inherent in the field of epigenetics. The second is socio-political: epigenetic research linking health risks to epigenomic alterations (e.g., toxic exposure; availability of nutrients in the womb; prenatal parental stress) within an individual body can easily shift responsibility onto already vulnerable individuals. By 'miniaturizing the environment' (Lock, 2015) in molecular epigenetics, the burden from the collective is shifted to the individual, thereby enforcing social norms concerning, for example, food habits and 'good motherhood', re-instating existing social health inequalities. Indeed, as sociologists have been arguing since quite some time, already vulnerable individuals often live in poorer housing conditions, polluted areas, and environments of cheap food consumption (see e.g. the Marmot Reviews). In this context, on what

grounds should epigenetics drive the creation and implementation of health and social policies?

In the next lecture, Maurizio Meloni (University of Sheffield) presented his latest work on the phenomenology of 'plasticity' in contemporary postgenomics (2018 forthcoming). The term is everywhere in contemporary postgenomics, but what sort of plasticity is taking place in programs like epigenetics and microbiomics? Is this a return to premodernist and ecological views of the body as radically embedded in and shaped by the forces of the surrounding places (humoralism as plasticity *avant la lettre*)? Or is it the apogee of a modernistic view of the body as a fully malleable, controllable, and 'enhanceable' object? Novel concepts in postgenomic biology provide insights into how early life events, and even events that were experienced by ancestors – events or 'environments' including bodies, history, culture, geography, economy, climate and nutrition – can 'turn genes on and off'. How might this change our ideas about nature, bodies, personhood and environment? In the postgenomic era, the boundaries between body and environment become increasingly blurred; the environment is 'inside the body' where the boundary of the skin is of little significance. Drawing on a parallel with the notion of 'sculpture' in plastic arts, Meloni demonstrated how plasticity in postgenomic biology implies that, instead of focusing on the fixity of traits and behavior, bodies are always malleable, as situated in time and place and coalesced with environmental forces – from the moment of conception on throughout life.

Drawing further on this idea of bodies as malleable in epigenetics, Katrin Solhdju (VUB/ KULeuven) gave a free 3D guided tour through the world of new social theories on symbiotic relations and natures-cultures with a detailed, vivid reading of the work of philosopher/anthropologist Donna Haraway (2017). Interestingly, these contemporary social theorists take an eager inspiration from approaches in postgenomics/biological research. For example, the work of biologist, Scott Gilbert**,** outlining a particular epi- and symbiogenetic perspective, is taken explicitly up in Haraway's book. Delving into contemporary biology, Gilbert and his colleagues have argued for new models in evolutionary biology representing a symbiotic view of life ('symbiogenesis'), while documenting the evidence for what they call an 'extended evolutionary synthesis' (Gilbert & Epel, 2015). Likewise, in their article 'We have never been individuals' (Gilbert, Sapp and Tauber, 2012), they criticize the notion of the 'biological individual' which has been crucial to studies of genetics, evolution, development, etc. Building on new insights in postgenomics, however, these definitions of individuality are challenged by finding significant interactions of animals and plants with symbiotic micro-organisms that disrupt the boundaries that before had characterized the biological individual. Taking stock of Gilbert's idea of 'symbiogenesis', Haraway weaves these ideas into her reflections about

'multi-layered living beings' – to mean "symbiotic assemblages, at whatever scale or time, which are more like knots of diverse intra-active relatings in dynamic complex systems, than like the entities of a biology made up of preexisting bounded units (genes, cells, organisms, etc.) in interactions that can only be conceived as competitive or cooperative" (Haraway, 2017: 77).

Shoshanah Dubiner, "Endosymbiosis: Homage to Lynn Margulis," http://www.cybermuse.com/

Drawing on Haraway's stories of the symbiotic relations ships between microbes, plants, animals and humans, Solhdju asked whether the attractiveness of this type of biology to social scientists derives purely from its epistemological characteristics – or whether it supplies us with new tools for the engaged articulation of epistemological, ethical and (cosmo)political questions? As demonstrated by the popularity of the Gilbert paper in social theory circuits, social scientists are increasingly engaging with these new ideas from biology. As was however discussed, there is a risk of 'over-romanticizing' the symbiosis argument ('beyond' nature/nurture) into a holistic 'happy living together' story. In presenting postgenomic symbiosis as another eco-*fix*, it could participate in yet another process of de-politicizing the political dimensions of (epi-)genetics. It was noted, however, that a close reading of Haraway's work should not encourage romanticism. The book title and key message is indeed to 'stay with the trouble'.

How then can we stay with the trouble without falling into the traps of both reductionism and universalism? And what would staying with the trouble

entail? As epigenetics invites us to reconsider our relation to the world as multi-layered living beings, does it not also urge us to reconsider the ways by which we pose social and political questions? Can epigenetics be considered as an occasion for learning how to think 'cosmopolitically' about our bodies and minds in health and disease? This was Kim Hendrickx' (KU Leuven) main question in his lecture "Can we learn how to speculate with epigenetics"? He started from a controversial example: research suggests that paternal obesity makes an epigenetic imprint within germ cells, and that this may lead to future health problems in offspring via the male germ line (Soubry et al., 2013). A number of scientists have reacted to this, saying that one should not blame 'fat dads' too quickly, without sufficient evidence (Moore and Stanier, 2013). Hendrickx took issue with this way of framing the problem: does it mean that we are allowed to blame 'fat dads' once the evidence is strong enough? Retracing the many entities and phenomena that were enrolled in the experimental setup (e.g., germ cells and spermatogenesis; insulin-like growth factor 2; cord blood; medical questionnaires asking about birth weight, sex, civil status), Hendrickx insisted on the mosaic nature of such experiments and the challenge to make everything relate in a meaningful way. He did not use this as a critique against the experiment, however, but to ask why, in view of such complexity, we tend to simplify in the end by referring to conventional categories such as 'individuals' (or 'fat dads') and issues of 'blame'. Can these categories still be taken for granted or is epigenetics inviting us to complexify our notions about what an 'actor' (or individual) is and the moral notion of responsibility? He ended with a challenging question: what if the moral is not simply a *projection* from the subjective mind upon nature? What if the two were inseparable, obliging us to address both at the same time?

Almost seamlessly, the final presentation of the workshop continued to elaborate that question. Didier Debaise's (ULB) philosophical lecture entitled 'Which metaphysics for epigenetics?'. Debaise initiated us into contemporary metaphysics and his 'speculative empiricism' (Debaise, 2017) based on a reading of Whitehead's *Process and Reality*, the English mathematician and philosopher. With Whitehead, Debaise posed a question both historical and metaphysical: what nature have the moderns constructed and invented? Historicizing 'nature' as a modern invention, Debaise explained Whitehead's original approach to this modern invention in terms of two operations that have made the very idea of 'nature' possible: bifurcation and localization. Bifurcation means that reality becomes split up into material things on the one hand, and immaterial minds on the other. 'Nature vs nurture' is another way of bifurcating reality and localizing its parts. This worldview is not shared by all cultures, and it has not always existed in the West either. Debaise insisted that such bifurcation is not a problem in itself and that it may serve practical purposes (such as in scientific experiments). However, bifurcation

becomes problematic when we forget that it is a specific operation. Referring back to Hendrickx' lecture, Debaise said that morality is seen as something that we *project onto* nature, while it has in fact been conceptually *removed* from nature in the first place (around the 17th Century with the distinction between primary and secondary qualities, heralded by philosophical Empiricism). Challenging and relevant for the epigenetic study of organisms and their biological time, Debaise asserted that, in Whitehead's vision, a being does not *have* a duration, but that it *is* a duration – it is nature itself multiplying, connecting, extending. Being is a verb and a nexus. Whitehead sees reality and beings as processes. Might this be a more fruitful metaphysics for epigenetics than the old division between nature and nurture?

In our final discussions, these tentative concepts to think both the biological and the social in different terms raised a very challenging question: it is one thing to propose new concepts to think in terms of process, connectedness and multi-layered beings, but it is quite another to operationalize them in society. More concretely: How can these lessons from epigenetics about the complexity of reality be combined with categories that seem necessary for questions of social and environmental responsibility and justice? Is the notion of 'the individual' not essential to define the bearer of rights and health protection against, for example, employers and firms? What happens to abortion rights if the 'individual' is said to be a biologically impertinent category (see e.g. Gilbert, Sapp and Tauber, 2012)? Yet, as the speakers had argued, there are cases where recourse to our modern ideas about individuals and cause or responsibility can be socially problematic too. The question then becomes how to make good use of our concepts. One way to define 'good use' is perhaps avoiding a taken-for-granted and automatic use of either 'symbiotic' repertoires or classical individualism. This raised the concern as well that epigenetics seems to work with social categories that have traditionally been understood to lie within the realm of the social sciences. Scholars in sociology of health have been proclaiming the importance of environmental and social factors in producing health inequalities. In light of this, another question was raised: If epigenetics makes 'nurture', past life, histories, and environments into contemporary hype, why do we 'need' the life sciences to bring these social factors (finally) into the spotlight? And what are the consequences of doing so?

Rather than beginning a 'turf war' (Kenney & Müller 2015) or, – maybe even less desirably -starting a 'symbiotic love affair', a growing number of social science scholars have argued that epigenetics can offer new occasions for experimental collaboration with the life sciences. This requires social scientists to be able to intervene so as to inform and influence scientific practice. Sociologist Hannah Landecker (2013) characterizes epigenetics not so much as a discipline or interdisciplinary

field, but as a new focus of attention that relates the biological, social, and political around common concerns. To proactively address these challenges, collaborative work with medical humanities and social science scholars might be both necessary and rewarding. In continuity with this Leuven workshop, co-organizer Kim Hendrickx is preparing for a follow-up event during his research stay at the Science & Justice Research Center of the University of California at Santa Cruz.

The list of abstracts and bios for all of the Leuven workshop presentations is available online at https://soc.kuleuven.be/ceso/life-sciences-society-lab/files/Think%28er%29ingWithEpigenetics

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Katrin Solhdju *is a cultural studies scholar with a focus on the history and philosophy of the life sciences and a permanent researcher for the FNRS in the department for Sociology and Anthropology at the Université de Mons in Belgium. Her research interests range from the Science and Technology Studies, the history and theory of experimentation and knowledge, and pragmatist philosophy to new reflections in the field of medical ethics. She is a member of the « Groupe d'études constructivistes » at the Universiteé Libre de Bruxelles, and a co-founder of the collective Dingdingdong. Institute for the co-production of knowledge on Huntington's Disease. She is the author of numerous articles as well as two monographs:* L'Épreuve du savoir. Propositions pour une écologie du diagnostic (*2015) and* Selbstexperimente. Die Suche nach der Innenperspektive und ihre epistemologischen *(Folgen, 2011).*

Kim Hendrickx *is Postdoctoral Fellow of the Research Foundation – Flanders (FWO). As an anthropologist and STS scholar, he is interested in the ways science and technology, such as epigenetics an environmental monitoring, (re-)define boundaries between bodies and environments. He has worked at the University of Liège, at Maastricht University, and is currently based at KU Leuven. In 2017-2018, he will be Research*

Associate at the Science & Justice Research Center, at the University of California, Santa Cruz.

Works cited

Debaise D (2017) *Speculative Empiricism. Revisiting Whitehead.* Duke University Press. In Press.

Gilbert SF, Sapp J and Tauber AI (2012) A Symbiotic View of Life: We Have Never Been Individuals. *The Quarterly Review of Biology* 87(4): 325-341.

Gilbert SF and Epel D (2015) *Ecological Developmental Biology. The Environmental Regulation of Development, Health and Evolution.* Oxford: Oxford University Press.

Haraway, D (2016) *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke University Press.

Keller EF (2000) *The Century of the Gene*. Cambridge, MA: Harvard University Press.

Kenney M and Müller R (2016) Of rats and women. Narratives of motherhood in environmental epigenetics. *BioSocieties* 12(1): 23-46.

Landecker H and Panofsky A (2013) From social structure to gene regulation, and back: A critical introduction to environmental epigenetics for sociology. *Annual Review of Sociology* 39: 333-57.

Lock M (2015) Comprehending the Body in the Era of the Epigenome. *Current Anthropology* 56(2): 151-177.

Meloni M (2016). *Political Biology: Science and Social Values in Human Heredity from Eugenics to Epigenetics. Palgrave Macmillan Press.*

Meloni M (2018). *A Postgenomic Body: A Genealogy of Human Plasticity.* Routledge, forthcoming.

Moore EG and Stanier P (2013) Fat dads must not be blamed for their children's health problems. *BMC Medicine* 11: 30.

Soubry A, Schildkraut JM, Murtha A, Wang F, Huang Z, Bernal A, Kurtzberg J, Jirtle RL, Murphy SK, Hoyo C (2013) Paternal obesity is associated with IGF2 hypomethylation in newborns: results from a

Newborn Epigenetics Study (NEST) cohort. *BMC Medicine* 11:29.

Weaver ICG et al (2004) Epigenetic programming by maternal behavior. *Nature Neuroscience* 7(8):847–854.

Notes

[1] The conference took place on June 15-16, 2017 at the Life Sciences & Society Lab, Centre for Sociological Research (CeSO) of the University of Leuven.We invited speakers and participants to investigate the social dimensions of epigenetics, across history and across disciplines, including sociology, anthropology, cultural studies, philosophy and the life sciences.

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